

The tribe *Coffeae* DC. (Rubiaceae: Ixoroideae) in Australia

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Summary

Forster, P.I. (2004). The tribe *Coffeae* DC. (Rubiaceae: Ixoroideae) in Australia. *Austrobaileya* 6 (4): 903–909. Two genera in the tribe *Coffeae* occur in Australia, namely *Coffea* L. (with the naturalised species *C. arabica* L. and the doubtfully naturalised *C. liberica* Hiern.) and *Psilanthus* Hook.f. (with the single non-endemic species *P. brassii* (J.-F.Leroy) A.P.Davis). A key to genera is provided, together with an amplified description and illustration for *Psilanthus brassii*.

Keywords: *Coffea*, *Psilanthus* – Australia

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Introduction

This paper provides an overview of the Tribe *Coffeae* (Rubiaceae: Ixoroideae) as it occurs in Australia. The tribal classification within the Rubiaceae was reviewed by Robbrecht & Puff (1986) and summarised by Robbrecht (1988) wherein a narrow circumscription for the tribe *Coffeae* DC. was proposed with only two genera included, namely *Coffea* L. and *Psilanthus* Hook.f. These two genera are closely allied and are distinguished primarily on growth habit (evergreen or deciduous) and floral features (e.g. length of corolla tube, style and stamen exertion), all characters that might be logically accommodated in a single genus. Limited (as to the number of taxa sampled) molecular work (chloroplast DNA) on *Psilanthus* does tend to indicate that this genus is discrete from *Coffea*, as the two species of *Psilanthus* sampled clustered as an outgroup to twenty-three taxa of *Coffea* (Cros *et al.* 1998). Extremely limited hybridization work between single species from the two genera (*Coffea arabica* L. and *Psilanthus ebracteolatus* Hiern) (Couturon *et al.* 1998) found few barriers to intergeneric gene transfer and these authors considered recognition of two genera was not warranted. Until further evidence is presented on the monophyly or otherwise of the genera in the *Coffeae*, the status quo is maintained here.

The genus *Coffea* has about 90 species that are native to Africa, Madagascar and the Mascarenes (Bridson 1988), with a couple of

species widely cultivated in the tropics for coffee. A single species of *Coffea* (*C. arabica* L.) is naturalised in Queensland (Halford & Reynolds 1994; Reynolds & Halford 1997; Forster & Halford 2002) and on Lord Howe and Norfolk Islands (Green 1994), although no detail has been provided to date on the Queensland naturalisations. A second species of *Coffea*, *C. liberica* Hiern. has been recorded from a single locality near Cape Tribulation; but is not considered fully naturalised, particularly as efforts have been made to eradicate it from the site.

The genus *Psilanthus* Hook.f. was newly recorded for Queensland, Australia by Bridson (1987) with a note that *Paracoffea brassii* J.-F.Leroy occurred in the Torres Strait, however, no combination was made in *Psilanthus* at that time. Davis (2003) has recently made the new combination *P. brassii* (J.-F.Leroy) A.P.Davis and recorded the species for Australia on the basis of several collections from Queensland (*Cunningham* 7 (K) and *Wannan* [1818] NSW443387 (NSW)). Davis (2003) recorded *Psilanthus brassii* from Central Province in Papua New Guinea and from Australia (“Torres Strait Island and Queensland”). He treated the Torres Strait Islands as being a separate political entity to the state of Queensland, which they are not, and the few specimens that he cited would indicate that the species only occurs in the Torres Strait and tip of Cape York in Queensland. Davis did not consult collections at the Queensland Herbarium (BRI), the major repository of material from Queensland, otherwise the known distribution of this species may have been better documented by him.

Apart from the original publication of *Paracoffea brassii* J.-F.Leroy (basionym for *Psilanthus brassii*) where there is a description in French (Leroy 1968), there is no description of this plant in English that includes coverage of the flowers, nor have the flowers been illustrated, hence these deficiencies are

remedied in the current paper. The genus *Psilanthus* has about twenty-one species that are found in tropical Africa, India and Malasia (Bridson 1987; Sivarajan *et al.* 1992) as well as the single species in Australia and New Guinea.

Taxonomy

Coffeae DC., Ann. Mus. Hist. Nat. 9: 217 (1807), emend Robbrecht & Puff (1986).
Type: *Coffea* L.

Refer to Robbrecht & Puff (1986), Robbrecht (1988) and Bridson (1988) for a tribal description.

Key to genera in Australia

- Evergreen shrubs; corolla-tube ± same length as lobes; style and anther fully exserted **Coffea**
- Deciduous shrubs; corolla tube longer than lobes; style and anthers included (anthers may be part exserted) **Psilanthus**

Coffea L., Sp. Pl. 172 (1753). **Type:** *C. arabica* L.

Refer to Bridson (1988) for a generic description.

Key to the Naturalised (or Doubtfully Naturalised) species of *Coffea* in Australia (N.B. these characters may not work for material of these species outside of this region)

- Leaf lamina elliptic; flowers 5-merous **C. arabica**
- Leaf lamina obovate; flowers 6-merous **C. liberica**

1. *Coffea arabica* L., Sp. Pl. 172 (1753).

Type: cultivated in Holland, *Hort. Clifford* (holo: BM).

Refer to Bridson (1988) or Green (1994) for a species description.

Specimens examined: Queensland. COOK DISTRICT: Curtain Fig site, SW of Yungaburra, 17° 17' S, 145° 34' E, May 2000, *Bean* 16559 (BRI); Daintree, Sep 1937, *Brass* 176 (BRI; CANB, L, MO *n.v.*); Pearamon Scrub, 4 km NE of Malanda, 17° 18' S, 145° 37' E, Oct 2000, *Forster* PIF26330 *et al.* (A, AD, BRI, K, MEL); Topaz, Towalla road, 17° 28' S, 145° 43' E, Oct 2001, *Forster* PIF27610 *et al.* (BRI, MEL, NSW); Lake Eacham N.P., S end of Picnic area, 17° 15', 145° 35' E, May 1985, *Melville* S15 (BRI); Rocky Creek, Atherton – Mareeba road, 17° 12' S, 145° 27' E, Sep 1959, *Smith* 10795 (BRI); Prior's Creek, Atherton, 17° 15' S, 145° 25' E, Oct 1992, *Swarbrick* 10551 (BRI); Kuranda, 16° 49' S, 145° 38' E, Nov 1992, *Swarbrick* 10621 (BRI). MORETON DISTRICT: Brisbane River, Long Pocket, Indooroopilly, 27° 31' S, 152° 59' E, Aug 2000, *Batianoff* 200828 (BRI, NSW); Property of D.Cunnington, Gwynore Crescent, Buderim, 26° 41' S, 153° 04' E, Aug 1995, *Bean* 8871 (BRI, MEL); Off Paynter Creek road, c. 1.5 mile E of Nambour, 26° 38' S, 153° 00' E, May 1977, *Elsol* 111 (BRI); Buderim Mt., Fountain road, 26° 45' S, 153° 05' E, Jul 1989, *Nielsen* [AQ456714] (BRI). **New South Wales.** LORD HOWE ISLAND. STEVENS RESERVE,

31° 31' S, 159° 03' E, Jan 2001, *Le Cussan* 1102 (BRI; ex NSW). NORFOLK ISLAND. Louis Evan's Market Garden, Duncombe Bay, 29° 00' S, 167° 55' E, Oct 1999, *Waterhouse* BMW5528 (BRI). **Map 1.**

Distribution and habitat: *Coffea arabica* (Arabian Coffee) is slowly naturalising in a number of localities in the 'Wet Tropics' of north-eastern Queensland, and around habitation in the south-eastern corner of the state (**Map 1**). The origins of these multiple naturalisations in Queensland are undoubtedly from cultivated plants, particularly in the 'Wet Tropics' around the Atherton Tableland, and near Buderim in the south-east. There are also localised naturalisations on both Lord Howe and Norfolk Islands (Green 1994). Arabian Coffee has been grown occasionally as a commercial crop or garden plant in these areas and is commonly encountered in gardens. Naturalised colonies of coffee have been recorded from the margins of rainforest, adjacent to old gardens or in disturbed situations where there is considerable shrubby undergrowth. It is presumed that bird mediated

dispersal of *Coffea arabica* fruit is occurring, but no direct observations are known. At this stage, *Coffea arabica* is lowly ranked in terms of its invasiveness potential (ranked 189/200 by Batianoff & Butler 2002) and is not considered a high priority invasive weed (Batianoff & Butler 2003).

Notes: Material of *Coffea arabica* from elsewhere, particularly within its natural distribution range, has a broader range of leaf lamina shape and floral part diversity than indicated in the above key (Bridson 1988).

2. *Coffea liberica* Hiern., Trans. Linn. Soc. Bot, sér. 2, 1: 171, t. 24 (1876).

Type: Sierra Leone, cultivated on Mr Effenhausen's farm, *Daniell s.n.* (lecto: BM, fide Bridson (1985: 806).

Refer to Bridson (1988) for a species description.

Specimens examined: Queensland. COOK DISTRICT: Cooper Creek, Cape Tribulation road, 16° 11' S, 145° 25' E, Oct 1998, Gray 7392 (BRI). **Map 2.**

Distribution and habitat: *Coffea liberica* is doubtfully naturalised at Cooper Creek in the 'Wet Tropics' of Queensland (**Map 2**) where it has been recorded in lowland complex mesophyll vineforest on substrates derived from metamorphics.

Notes: The material from Cooper Creek appears to fall within the variation ascribed to *Coffea liberica* var. *liberica*, viz. corolla 6–9-merous, tube distinctly widened at the throat, lobes usually 5–10 mm wide (Bridson 1988).

It is likely that this species may continue to pose a problem as a naturalised plant in the Cape Tribulation area unless follow-up eradication procedures are employed.

Psilanthus Hook.f., Gen. Pl. 2: 115 (1873).

Refer to Bridson (1988) for a generic description.

A genus of c. 22 species. One non-endemic species in Australia (Queensland).

Psilanthus brassii (J.-F.Leroy) A.P.Davis, Novon 13: 183 (2003).

Paracoffea brassii J.-F.Leroy, J. Agric. Trop. Bot. Appl. 14: 598 (1967).

Type: Papua New Guinea. CENTRAL PROVINCE: Baroka, Nakeo district, 8 April 1933, L.J. Brass 3743 (holo: BO *n.v.*; iso: A *n.v.*; BRI).

[*Randia* sp. (Coen B.P.Hyland 13278) (Reynolds & Halford 1997)]

Illustration: Leroy (1968: 599).

Shrub to 3 m high, deciduous. Indumentum absent or of simple, uniseriate trichomes. Leaf bearing stems slender, covered with thin reddish-brown bark, glabrous or with scattered to sparse trichomes. Stipules truncate to irregularly triangular, basal tubular portion 0.8–1.5 mm long, free apiculate portion 1.8–4 mm long. Leaves petiolate; petioles 4–5 mm long; lamina elliptic to obovate, 25–95 mm long, 12–60 mm wide, thin, papery, discolorous and drying grey-green, glabrous or with scattered to sparse indumentum abaxially on midrib and some lateral veins; domatia absent or present abaxially as small tufts of indumentum in angle between midrib and lateral veins; midrib and some lateral veins whitish on abaxial surface; tip acute to short acuminate; base cuneate. Flowers solitary and terminal on stems, sometimes on a short shoot to 5 mm long; flowers pedicellate for 1.5–2 mm, immediately subtended by short bracteoles, that are \pm truncate, 0.4–1 mm long, then subtended (or not) by a leaf pair (shed in fruit), finally subtended by 4 bracts (shed in fruit) that are lanceolate, 3–5.8 mm long and 0.8–1.2 mm wide. Calyx tube 1.8–3 mm long, c. 1 mm diameter, bearing 4 or 5 unequal lobes that are shortly acute, 0.3–0.5 mm long. Corolla glabrous; tube 16–18 mm long, 2.8–3 mm wide at top, 1.2–1.6 mm wide at base; lobes acute, 10–13 mm long, 4.5–6 mm wide, attached 14–15 mm from base. Stamens 5; anthers attached near apex of tube with only the tips exerted, 6–6.5 mm long, c. 0.6 mm wide. Style c. 5 mm long; stigma lanceolate, c. 2.5 mm long, positioned 5–6 mm below the anthers. Fruit bilobed (rarely trilobed), soft-fleshy, 7–8 mm long, 7.5–8 mm wide, black to plum coloured; seeds 2 (3) per fruit, oblong-ellipsoid, c. 6 mm long and 5 mm wide, fawn, distinctly grooved on adaxial face. **Fig. 1.**

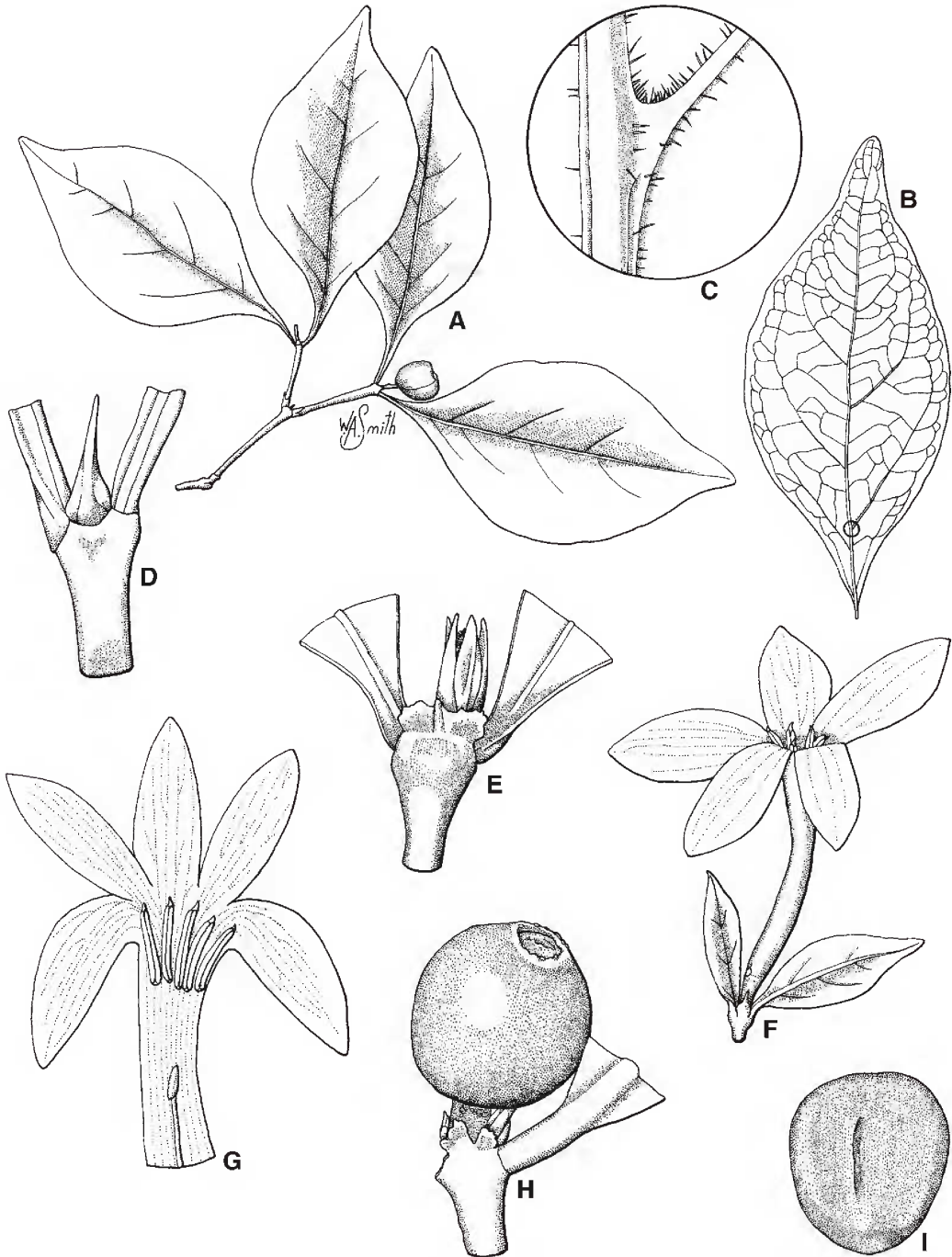


Fig. 1. *Psilanthus brassii*. A. branchlet with fruit. $\times 0.8$. B. underside of leaf showing venation. $\times 1$. C. indumentum on underside of leaf (area indicated in circle in B) with domatium in angle between vein and midrib. $\times 16$. D. node with stipule. $\times 8$. E. node with inflorescence bearing four bracts. $\times 4$. F. inflorescence with leaf pair and flower. $\times 4$. G. dissected corolla with stamens and pistil. $\times 4$. H. node with fruiting inflorescence. $\times 3$. I. seed showing groove on adaxial face. $\times 4$. A & D from *Fell* DGF2919 (BRI); B, C, H, I from *Forster* PIF19452 (BRI); F & G from *Wannan* 1418 (BRI); E from *Puttock & King* UNSW16901 (BRI). Del. W.Smith.

Specimens examined: Papua New Guinea. CENTRAL PROVINCE: Tovobada Hills, 12 miles [20 km] N of Port Moresby, May 1965, *Heyligers* 1199 (BRI; CANB, L, LAE *n.v.*); Near SE side of Little Mt Lawes, c. 16 miles [26.7 km] N of Port Moresby, Apr 1967, *Pullen* 6814 (BRI; A, CANB, K, L, LAE *n.v.*); Tovobada Hills, c. 9 miles [15 km] NNW of Port Moresby, May 1965, *Pullen* 6980 (BRI; A, BO, CANB, K, L, LAE, US *n.v.*). Australia. COOK DISTRICT: 10.8 km S of Batavia Downs on the Peninsula Development road, 12° 45' S, 142° 43' E, Apr 1990, *Clarkson* 8463 & *Neldner* (BRI, L, MBA); Jane Table Hill, Lakefield N.P., 46.6 km N of Lakefield Homestead, 14° 30' S, 144° 07' E, Mar 1993, *Fell* DGF2919 & *Stanton* (BRI, MEL); Cape Melville N.P., Altanmoui Range section, 1.6 km E of Flat Hill, 62.6 km NE of Lakefield Homestead, 14° 30' S, 144° 35' E, May 1993, *Fell* DGF3215 & *Stanton* (BRI); Altanmoui Range, Cape Melville N.P., 1.6 km E of Flat Hill, 62.6 km NE of Lakefield Ranger Base, 14° 30' S, 144° 35' E, May 1994, *Fell* DGF4350 & *McDonald* (BRI); Equina Scrub, 42.4 km W of Coen, Holroyd Pastoral Holding, 13° 59' S, 142° 48' E, Jun 1994, *Fell* DGF4397 & *Buck* (BRI); Round Mountain, Embley Range, 13° 33' S, 143° 30' E, Jun 1992, *Forster* PIF10467 & *Tucker* (BRI); Klondyke, Station Creek track, McIlwraith Range, 14° 00' S, 143° 19' E, Jun 1996, *Forster* PIF19452 (BRI); Gore Island, Great Barrier Reef, 11° 59' S, 143° 14' E, Apr 1995, *Gray* 6125 (BRI; ex QRS); T.R. 14, Parish of Kesteven, 13° 42' S, 143° 18' E, Nov 1991, *Hyland* 14378 (BRI; ex QRS); Restoration Island, 12° 36' S, 143° 26' E, Apr 1995, *Le Cussan* 286 (BRI); Haggerstone Island, 12° 03' S, 143° 18' E, May 1995, *Le Cussan* 339 (BRI); Portland Roads, c. 0.5 km S of headland, 12° 36' S, 143° 24' E, *Puttock & King* UNSW16901 (BRI); 1 km S of Seisia, 10° 51' S, 142° 21' E, Nov 1999, *Wannan* 1418 (BRI, NSW).

Distribution and habitat: *Psilanthus brassii* has been recorded from Central Province of Papua New Guinea (in the vicinity of Port Moresby) and from the Cook District of Queensland with a northern occurrence on islands in Torres Strait and a southern limit at Altanmoui Range, Cape Melville (**Map 2**). Plants grow in “monsoon” forest (semi-deciduous microphyll to notophyll vineforest) on substrates derived from stabilised sand-dunes, laterite, sandstone or metamorphics at altitudes from near sea level to 300 m.

Notes: The identity of this species was first debated by Merrill & Perry (1945) who referred collections from Papua New Guinea (*Brass* 3743; *Carr* 11220 & 12389) and the Torres Strait (Sunday Island) (*Cunningham* 7) to *Coffea* (*Lachnostoma*) with a ? Nearly 60 years on and with the addition of the collection by *Wannan*, Davis (2003) finally classified this species in *Psilanthus*. This delay in identification has undoubtedly been influenced by the lack of flowering material (only *Hyland* 14378 and *Wannan* 1418 have flowers). The deciduous habit of *Psilanthus brassii* means

that the plant is probably leafless between the months of September and November. Flowering commences with the onset of storm rain in November and December just prior to, or as the plants produce new leaves after the end of the ‘dry’ season. Fruits have been collected between March and June and are borne on plants where the leaves are fully expanded and hardened. This pattern of floral and fruiting behaviour is not unusual and is repeated in a wide range of plant species from diverse families that grow in the so-called ‘wet – dry’ tropics. Good examples of species with this phenological behaviour are *Croton simulans* P.I.Forst. (Euphorbiaceae) (Forster 2003), *Drypetes deplanchei* (Brongn. & Gris) Merr. (Euphorbiaceae) (Forster 1997), *Gyrocarpus americanus* Jacq. (Hernandiaceae), *Mallotus surculosus* P.I.Forst. (Euphorbiaceae) (Forster 1999) and *Turraea pubescens* Hellen. (Meliaceae). Nevertheless this phenological behaviour can make identification of this Rubiaceae plant difficult when it is leafless or with only immature leaves.

Davis (2003) noted that *Psilanthus brassii* was similar to *P. mabesae* (Elmer) J.-F.Leroy from the Philippines but differed in the “leaves, flowers (corolla), and fruits... glabrous (not puberulous to pubescent as in *P. mabesae*)”. With the greater amount of material of *Psilanthus brassii* now available, these distinctions are not strictly correct. Although the flowers (corolla) and fruits of *P. brassii* are glabrous, not all collections have glabrous foliage. The collections *Fell* DGF4397, *Forster* PIF19452, *Le Cussan* 266 & 399, have from between a few scattered hairs on the leaf midrib below, to being sparsely hairy on the leaf undersurface and young shoot tips. While most collections lack leaf domatia, those that are pubescent to some degree also have occasional small domatia formed in the angle between the midrib and a lateral vein.

There is some slight variation in the arrangement of bracts and bracteoles in the inflorescence of this species. In its simplest form, the terminal inflorescence is subtended by two small bracteoles (retained in the fruit) that are in turn subtended by four linear-lanceolate bracts that are caducous. In its most complex form, the terminal inflorescence is

once again subtended by the two small bracteoles (retained in the fruit), that are subtended by the four linear-lanceolate bracts, then further subtended by a pair of true leaves, the stipular pair, then a short shoot, followed by the four linear-lanceolate bracts and a pair of stipules again. Whether the most complex form has been derived from an inflorescence that has flowered and then produced a new shoot terminally, followed by yet another inflorescence is unknown without actual observation of live plants.

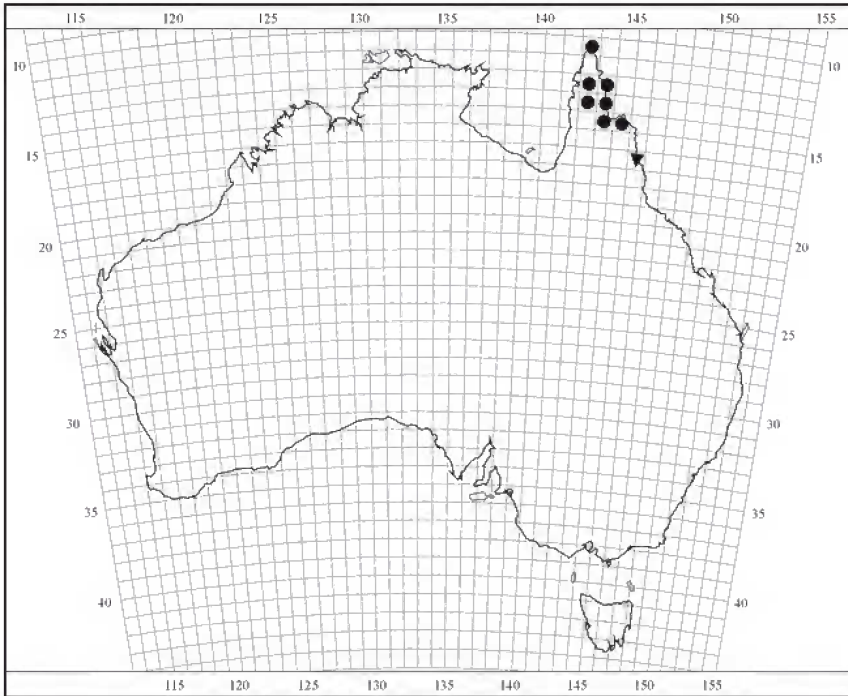
Conservation status: *Psilanthus brassii* is widespread on Cape York Peninsula and some islands in Torres Strait. It has been recorded from Cape Melville and Lakefield National Parks. Davis (2003) listed it as of **Least Concern**; however, this was based on limited information about its distribution or perceived threats. It is not considered rare or threatened at present.

Acknowledgements

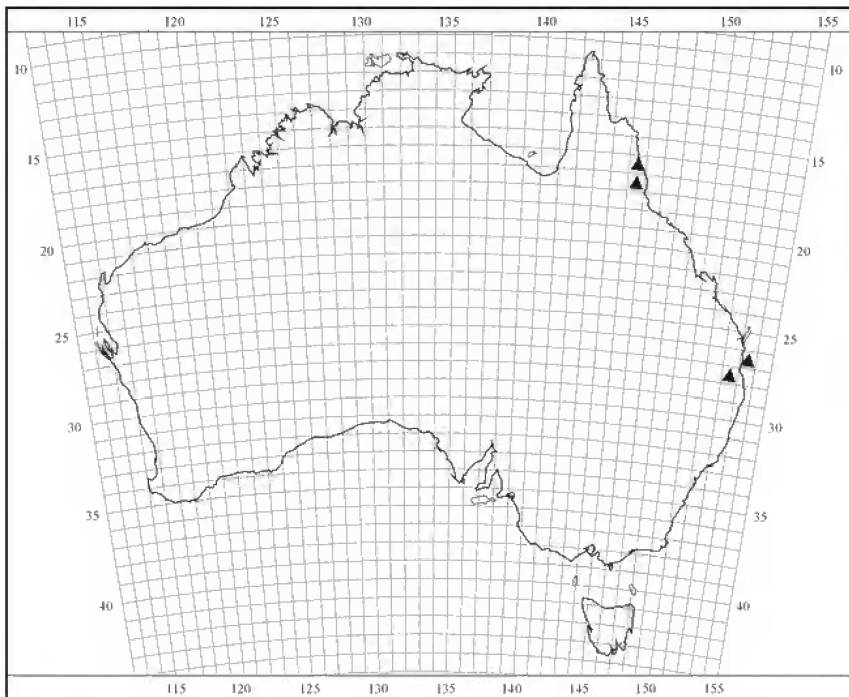
Field collections of the two species concerned were facilitated with the assistance of R.Booth (BRI), R. Jensen, G. Sankowsky and M.C. Tucker. Artwork was executed by W. Smith (BRI).

References

- BATIANOFF, G.N. & BUTLER, D.W. (2002). Assessment of invasive naturalized plants in south-east Queensland. *Plant Protection Quarterly* 17: 27–34.
- (2003). Impact assessment and analysis of sixty-six priority invasive weeds in south-east Queensland. *Plant Protection Quarterly* 18: 11–17.
- BRIDSON, D.M. (1985). The lectotypification of *Coffea liberica* (Rubiaceae). *Kew Bulletin* 40: 805–807.
- (1987). Nomenclatural notes on *Psilanthus*, including *Coffea* sect. *Paracoffea* (Rubiaceae tribe Coffeae). *Kew Bulletin* 42: 453–460.
- (1988). *Psilanthus*. In R.M.Phill (ed.), D.M.Bridson & B.Verdcourt, *Flora of Tropical Africa*, Rubiaceae, Part 2, pp. 723–727. Rotterdam/Brookfield: Balkema.
- COUTURON, E., LASERMES, P. & CHARRIER, A. (1998). First intergeneric hybrids (*Psilanthus ebracteolatus* Hiern. × *Coffea arabica* L.) in coffee trees. *Canadian Journal of Botany* 76: 542–546.
- CROS, J., COMBES, M.C., TROUSLOT, P., ANTHONY, F., HAMON, S., CHARRIER, A. & LASERMES, P. (1998). Phylogenetic analysis of chloroplast DNA variation in *Coffea* L. *Molecular Phylogenetics & Evolution* 9: 109–117.
- DAVIS, A.P. (2003). A new combination in *Psilanthus* (Rubiaceae) for Australasia, and nomenclatural notes on *Paracoffea*. *Novon* 13: 182–184.
- FORSTER, P.I. (1997). A taxonomic revision of *Drypetes* Vahl (Euphorbiaceae) in Australia. *Austrobaileya* 4: 477–494.
- (1999). A taxonomic revision of *Mallotus* Lour. (Euphorbiaceae) in Australia. *Austrobaileya* 5: 457–497.
- (2003). A taxonomic revision of *Croton* L. (Euphorbiaceae) in Australia. *Austrobaileya* 6: 349–436.
- FORSTER, P.I. & HALFORD, D.A. (2002). Rubiaceae. In R.J.F.Henderson (ed.), *Names and Distribution of Queensland Plants, Algae and Lichens*, pp. 173–177. Brisbane: Environmental Protection Agency.
- GREEN, P.S. (1994). Rubiaceae. *Flora of Australia* 49: 350–359. Canberra: Australian Government Publishing Service.
- HALFORD, D.A. & REYNOLDS, S.T. (1994). Rubiaceae. In R.J.F.Henderson (ed.), *Queensland Vascular Plants Names and Distribution*, pp. 294–301. Brisbane: Queensland Department of Environment & Heritage.
- LEROY, J.-F. (1967, published 1968). Un Caféier du genre *Paracoffea* en Nouvelle-Guinée. *Journal d'Agriculture Tropicale et de Botanique Appliquée* 14: 598–600.
- (1981). Les caféiers du genre *Psilanthus* (Rubiaceae) en Afrique orientale et en Asie et îles du Pacifique. *Bull. Mus. Natl. Hist., Nat., B, Adansonia* 3: 251–258.
- MERRILL, E.D. & PERRY, L.M. (1945). Plantae Papuanae Archboldianae, XVI. *Journal of the Arnold Arboretum* 26: 229–266.
- REYNOLDS, S.T. & HALFORD, D.A. (1997). Rubiaceae. In R.J.F.Henderson (ed.), *Queensland Plants Names and Distribution*, pp. 180–184. Brisbane: Department of Environment.
- ROBBRECHT, E. (1988). Tropical Woody Rubiaceae. *Opera Botanica Belgica* 1: 1–271.
- ROBBRECHT, E. & PUFF, C. (1986). A survey of the Gardenieae and related tribes (Rubiaceae). *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 108: 63–137.
- SIVARAJAN, V.V., BIJU, S.D. & MATHEW, P. (1992). Revision of the genus *Psilanthus* Hook.f. (Rubiaceae tribe Coffeae) in India. *Botanical Bulletin of Academia Sinica (Taipei)* 33: 209–224.



Map 1. Distribution in 1° grids in Australia for *Coffea liberica* ▼ and *Psilanthus brassii* ● .



Map 2. Distribution in 1° grids in Australia (excluding Lord Howe and Norfolk Islands) for *Coffea arabica* ▲ .